



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,541	04/27/2006	Christopher W. Cline	FIS920030079US1	2592
33074 7590 10/22/2009 INTERNATIONAL BUSINESS MACHINES CORPORATION DEPT. 18G BLDG. 321-482 2070 ROUTE 52 HOPEWELL JUNCTION, NY 12533				
			EXAMINER HOLLINGTON, JERMELE M	
			ART UNIT 2829	PAPER NUMBER
			NOTIFICATION DATE 10/22/2009	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

EFIPLAW@US.IBM.COM

Office Action Summary

Application No.

10/595,541

Applicant(s)

CLINE ET AL.

Examiner

Jermele M. Hollington

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed July 2, 2009 have been fully considered but they are not persuasive.

The applicants' argue: "*Bohlen describes a non-contact method of testing the electrical continuity of a conductor line by use of an electron beam. FIG. 1 of Bohlen describes a conductor 1 embedded in a carrier 2 and having conductor ends 3 and 4. Collectors 13 and 14 of metal layer 12 "function to catch the secondary electrons leaving the respective adjacent conductor end 3, 4." Column 2, lines 65-58. However, Bohlen does not describe or suggest the recited "an array of probes in physical contact to said bottom surface conductive features, as claimed in independent Claims 1 and 24. In contrast and as clearly shown in Bohlen's FIG. 1, collectors 13, 14 are clearly physically isolated from conductor feature 1 and further are not in contact with the bottom surface but above the top surface. The only structure shown below the bottom surface are terminals 16 and 17 which are not probes and applicant submits were place below the bottom surface for the draftsman's convenience not to show probes in contact with the Bottom Surface of the conductive features. As can clearly be seen from Figure 1 of Bohlen, all of the elements of Bohlen are above the Top Surface of the conductive features. Accordingly, independent Claims 1 and 24 are believed to be patentable over Bohlen. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.*"

In response to the above arguments, the claims states: "An apparatus (method) for the non-contact electrical test of electronic substrates..." The claims further states: "...an array of probes securely in contact with said bottom surface conductive features..." If the conductive features are located on the electronic substrates, then the array of probes is not in contact with the bottom conductive features as claimed. As the result, the examiner believes that the array of probes and conductive features and in electrical contact and not directly contact as assumingly stated above. With that in mind, Bohlen discloses an array of probes (collectors 13, 14) in

electrical contact with the bottom surface conductive features (1) via ends 3 and 4 as discussed in col. 2, lines 62-67. Therefore, the examiner believes the prior art still reads on the claimed invention.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 24 and 44, each claim states: "...an array of probes securely in contact with said bottom surface conductive features..." The bottom surface conductive features are part of the electronic substrate. In lines 1-2 of all claims, they state: "...for the non-contact electrical...test of electronic substrates..." It appears from lines 1-2 of the claims that no items are contacting the electronic substrates or the features of the substrates. Therefore, from the examiner's view, the array of probes is not contacting the bottom surface conductive features as claimed.

For examination purposes, the examiner is taking a position that the array of probes is an electrical contact with the conductive features instead of "securely in contact" as stated in the claims. Since claims 2-23 depends from claim 1, claims 25-43 depends from claim 24 and claims 45 and 46 depend from claim 44, they all are also rejected for the above reasons.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 6, 8 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by BOHLEN et al (3764898).

Regarding claims 1 and 24, BOHLEN et al. disclose apparatus and method for non-contact electrical test of electronic substrates comprising at least one electronic substrate (part of carrier 2) having top surface conductive features (conductive ends 3, 4) on a top side of electronic substrate (part of 2) in electrical contact with bottom surface conductive features (conductor 1) on a bottom side of electronic substrate (part of 2), an ionization source (electron beams)[see col. 3 lines 5-9] positioned above said top surface of electronic substrate (part of 2) and connected to a first voltage source (inherent feature since voltage source is required for creating ionization potential), a fixture holding substrate (carrier 2), an array of probes (collectors 13,14) in electrical contact with the bottom surface conductive features (1) [via ends 3 and 4 see col. 2, lines 62-67], a second voltage source connected to array of probes (13,14) [a DC voltage is applied between collectors 13,14 see col. 3 lines 5-6], and current measuring electronics in contact with said array of probes (see col. 2 lines 23-26).

Regarding claims 6 and 8, BOHLEN et al. discloses shield (screen) 10 between ionization source and top conductive feature connected to third voltage source [see col. 2 line 66 to column 3 line 4].

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 2-4 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over BOHLEN et al. (US 3,764,898 A) in view of Lagowski (US 6,538,462 B1).

Regarding claims 2-4, 25-27 BOHLEN et al. disclosed all of the claimed limitations as set forth above except ionization source comprising conductive wire or ribbon or wire mesh, which is well known in the art. Lagowski (US 6,538,462 B1) discloses wire type ionization source for gate dielectric integrity testing using corona discharge. At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify BOHLEN et al. by adding ionization source comprising conductive wire (ribbon or wire mesh are obvious variants) disclosed by Lagowski et al. for producing corona discharge for circuit integrity testing.

9. Claims 5 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over BOHLEN et al. (US 3,764,898 A) in view of Wakalopulos (US 3,970,892 A).

Regarding claims 5 and 28 BOHLEN et al. disclosed all of the claimed limitations as set forth above except ionization source is coated with molybdenum. Wakalopulos (US 3,970,892 A) discloses ionization source (ion plasma electron gun) comprising electrode made of molybdenum, which is a conductive electrode material. At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify BOHLEN et al. by adding molybdenum coating to ionization source disclosed by Wakalopulos for increased conductivity.

10. Claims 7-17, 29-38 and 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over BOHLEN et al. (US 3,764,898 A).

Regarding claims 7-17, and 29-38, BOHLEN et al. disclosed negatively biased shield 10 to facilitate the collection of secondary electrons by the collectors (probes). BOHLEN et al. did not explicitly disclose that the shield is cylindrical and segmented and that the first voltage is approximately 5,000 V and second voltage is approximately 2,500 V and fixture comprises conductive material having tapered geometry and connected to fourth voltage having a voltage between first and second voltage wherein fourth voltage is approximately ground, and fixture is comprised of conductive material. At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify BOHLEN et al. by adding segmented cylindrical shield so that they can be separately biased to modify the electric field distribution (field shaping) on conductive surface based on the first, second voltage, third and fourth voltages and by providing fixture comprised of conductive material for achieving a conductive ground connection.

Regarding claims 11, 12, 34, and 35 BOHLEN et al. did not explicitly disclose positive and negative ionization source but would have been obvious to do so for electrical testing electronic device in a wide voltage range. At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify BOHLEN et al. by adding positive and negative ionization source for electrical testing electronic device in a wider voltage range.

Regarding claim 44, BOHLEN et al. disclosed (Fig. 3) method for non-contact electrical short [continuity of conducting lines in multilayered structure](interruption or short) test comprising one substrate having conductive features (wiring component) on top and bottom surface, securing electronic substrate in fixture (carrier 2), creating a region of ionized particle at an ionized source (electron beam) by applying a first voltage to ionized source, applying a second voltage to bottom surface (lower layer 24) [see col. 5 lines 15,16] creating charge buildup and draining the charge through array of probes (collectors 25) connected to bottom surface, and measuring drain current (collector current) for detecting open (interruption) in conductive feature (wiring component) (see col. 5 lines 1-42). BOHLEN et al. did not expressly disclose applying a different bias voltage on each probe (collector) for detecting shorts. At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify BOHLEN et al. by adding different bias voltage on each probe (collector) based on the impedance of the circuit under test to determine conclusively the state (short or interruptions) of the conductor line.

Regarding claims 45 and 46, BOHLEN et al. did not expressly disclose the step of measuring voltage bias of each of the said array of probes without ionization source and electronic substrate but would have been obvious to do for calibration of apparatus. At the time

the invention was made it would have been obvious for one of ordinary skill in the art to modify BOHLEN et al. by adding the steps of measuring the different bias voltage on each probe (collector) for calibration of apparatus.

11. Claims 18-23 and 39-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over BOHLEN et al. (US 3,764,898 A) in view of Nishioka et al. (US 6,043,665 A).

Regarding claims 18-23 and 39-43 BOHLEN et al. disclosed all of the claimed limitations as set forth above except electronic measurement circuit comprising logarithmic amplifier. Nishioka et al. (US 6,043,665 A) discloses electronics measurement circuit comprising logarithmic amplifier for measuring charging current. At the time the invention was made it would have been obvious for one of ordinary skill in the art to modify BOHLEN et al. by adding logarithmic amplifier disclosed by Nishioka et al. for measuring current in electronics measurement circuit.

Conclusion

Base on the above arguments and rejections, the following is being applied.

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jermele M. Hollington whose telephone number is (571) 272-1960. The examiner can normally be reached on M-F (9:00-4:00 EST) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ha Nguyen can be reached on (571) 272-1678. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jermele M. Hollington/
Primary Examiner
Art Unit 2829

/J. M. H./
October 19, 2009